

FSH 2090.21 – AQUATIC HABITAT MANAGEMENT HANDBOOK  
CHAPTER 20 – FISH AND AQUATIC STREAM HABITAT SURVEY

25 – Exhibit 01

Parameters to be measured for each Tier 2, 3, 4 survey

| Parameter                                    | Tier 2   | Tier 3   | Tier 4   |
|--|--|--|--|
| <b>Channel</b>                               | At least one time per channel type.  | Increase frequency (3 or more per channel type).   | Every (5) x (average channel bed width).   |
| <b>Morphology</b><br>(section 23.1)          | At a randomly chosen starting point within a single thread riffle.<br>Record hip chain distance relative to a geographical landmark.<br>Calculate discharge using WINXSPRO or float method.<br>Record approx. average channel bed width. | At a randomly chosen starting point within a single thread riffle.<br>Record hip chain distance relative to a geographical landmark.<br>Calculate discharge using WINXSPRO or float method.<br>Record approx. average channel bed width.                                       | At a randomly chosen starting point within a single thread riffle.<br>Record hip chain distance relative to a geographical landmark.<br>Record velocity and calculate discharge once per channel type (USGS method).<br>Conduct a longitudinal profile survey.<br>Record approx. avg. channel bed width. |
| <b>Stream Survey Units</b><br>(section 23.2) |  |  |  |
| <b>Survey Length</b>                         | Continuous hip chain entire survey (meters).   | Same   | Same   |
| <b>Channel Bed Width</b>                     | Record channel bed width every 5th approx. average channel bed width.  | Same   | Same   |
| <b>Pools</b><br>(section 23.22)              | Count—by macro.<br>Record required minimum residual pool depth.<br>Record maximum and pool tail crest depth of each pool (m).  | Count—by meso.<br>Record required minimum residual pool depth.<br>Record length (meters).<br>Record maximum and pool tail crest depth of each pool (m).<br>Record average wetted width (meters).<br>If using ocular estimates:<br>calibrate every 5th unit for each unit type. | Count—by micro.<br>Record required minimum residual pool depth.<br>Record length (meters).<br>Record maximum and pool tail crest depth of each pool (m).<br>Record average wetted width (meters).<br>If using ocular estimates:<br>calibrate every 5th unit for each unit type.                          |
| <b>Fastwater</b><br>(section 24.24)          |  | Record by meso category.<br>Record length.<br>Record average wetted width.<br>If using ocular estimates:<br>calibrate every 5th unit for each unit type.   | Record by micro category.<br>Record length.<br>Record average wetted width.<br>If using ocular estimates:<br>calibrate every 5th unit for each unit type.  |
| <b>Large Wood</b><br>(section 23.3)          | Count all qualifying pieces in zones 1 & 2 except those in beaver dams.<br>Count key pieces.   | Count all qualifying pieces in zones 1 & 2 except those in beaver dams.<br>Count key pieces.<br>Count wood clusters in two categories.   | Count all qualifying pieces in zones 1 & 2 except those in beaver dams.<br>Count key pieces.<br>Count wood clusters in two categories.<br>Count LWD pieces & key pieces found in zone 3 but record separately from zones 1 & 2.<br>Categorize pieces of wood by size class.                              |
| <b>Disturbance</b><br>(section 23.4)         | Length (m) of stream where disturbance enters stream (by disturbance category).<br>Record stream bank location (DL, DR, BB).   | Same   | Same   |
| <b>Stream Buffer</b><br>(section 23.5)       | Length (m) of bank bordered by harvest.<br>Average width of “buffer” in categories.<br>Record stream bank location (DL, DR, BB).   | Same   | Same   |

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| Parameter  | Tier 2   | Tier 3  | Tier 4  |
|--|--|---|---|
| <b>Side Channel</b><br>(section 23.6)                                  | Record sidechannel length (m).<br>Record streambank location.<br>Record hip-chain distance of inlet/outlet relative to LLID or GIS node.<br>Record approx. avg. channel bed width.<br>Record channel bed width at a distance of approx. every 5th avg. channel bed width.<br>Record minimum required residual pool depth.<br>Count qualifying macro pools.<br>Record maximum depth & pool tail crest depth.<br>Count large wood.<br>Count key piece (scaled to the side channel average channel bed width).<br>Record if channel is flowing, intermittent, or dry. | Record sidechannel length (m).<br>Record streambank location.<br>Record hip-chain distance of inlet/outlet relative to LLID or GIS node.<br>Record approx. average channel bed width.<br>Record channel bed width at a distance of every 5th approx. avg. channel bed width.<br>Record minimum required residual pool depth, pool length, & average wetted width.<br>Count qualifying macro pools.<br>Record maximum depth & pool tail crest depth.<br>Record fastwater length & average wetted width.<br>Count large wood.<br>Count key piece wood (scaled to the sidechannel average channel bed width).<br>Count large wood clusters in two categories.<br>Habitat unit survey to meso level.<br>Record if channel is flowing, intermittent, or dry. | Record sidechannel length (m).<br>Record streambank location.<br>Record hip-chain distance of inlet/outlet relative to LLID or GIS node.<br>Record approx. average channel bed width.<br>Record channel bed width at a distance of every 5th approx. average channel bed width.<br>Record minimum required residual pool depth, pool length, & average wetted width.<br>Count qualifying macro pools.<br>Record maximum depth and pool tail crest depth.<br>Record fast water length and average wetted width.<br>Count large wood by size category.<br>Count key piece wood (scaled to the sidechannel average channel bed width).<br>Count large wood clusters in two categories.<br>Habitat unit survey to micro level.<br>Record if channel is flowing, intermittent, or dry. |
| <b>Beaver Ponds</b><br>(section 23.23)                                 | Estimate area of ponds that would be connected to the channel at bankfull flow.<br>Record streambank location (DL, DR, MC).  | Same  | Same  |
| <b>Undercut Bank</b><br>(section 24.7)                                 |  | Length (m) of undercut banks for both banks at bankfull stage.<br>Record for wet or dry banks >0.3 m deep, > 1.0 m long.  | Length (m) of undercut banks for both banks at bankfull stage.<br>Record for wet or dry banks >0.3 m deep, >1.0 m long.<br>Record width (m) of overhang.  |
| <b>Riparian Vegetation &amp; Forest Seral Stage</b><br>(section 24.11) |  | As required for morphology measurements.<br>Record vegetation type and seral stage.   | Choice of four methods, dependent on survey objectives:<br>Same as Tier 3.<br>Plant assoc. transects laterally across riparian area.<br>Plant assoc. plots randomly within riparian.<br>Plant assoc. adjacent to stream at morphology sites.  |
| <b>Fish</b><br>(section 22.6)  | Note fish presence by species for each stream segment at end of segment.<br>Note location of migration barriers and complete channel morph card.<br>Record LLID location of upstream limit of captured fish for Alaska Catalog of Anadromous Waters (fish in hand).  | Fish CPUE by species for each stream segment.<br>Sample population using minnow traps or dive surveys.<br>Note location of migration barriers and complete channel morph card.<br>Record LLID location of upstream limit of captured fish.  | Fish population estimate by species for each stream segment.<br>Assess population using diver counts, mark-recapture, or catch depletion sampling.<br>Dive every 5th pool (at Macro pool level).<br>Dive every 10th fastwater.<br>Count by size class (<60 mm or >60 mm) & species.<br>Verify dive counts every 10th dive, minnow trap or electroshock.<br>Measure fork length (mm) and weight (g).<br>Migration barrier location & complete channel morphology card.<br>Record LLID location of upstream limit of captured fish.   |
| <b>Substrate</b><br>(section 23.16)                                    | As required for morphology measurements.   | As required for morphology measurements.<br>Record dominant substrate code by habitat unit.   | As required for morphology measurements.<br>Dominant substrate code and % covered per habitat unit.   |
| <b>Cover</b><br>(section 25)   |  |   | Record dominant cover type for each habitat unit.<br>Record % of habitat unit with that cover type.   |

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25 – Exhibit 02  
Stream Survey Units

| Measure For Survey Tier  | 2 | 3 | 4 | Catagories   | Codes   |
|--------------------------|---|---|---|--------------|---|
| <b>Survey length</b>     | X | X | X |              | Continuous hip chain entire survey (meters)                               |
| <b>Channel bed width</b> | X | X | X |              | Record channel bed width at a distance = 5X average channel bed width     |
| <b>Pools</b>             | X | X | X |              | Count qualifying macro pools  |
|                          | X | X | X |              | Record minimum required residual pool depth                               |
|                          |   | X | X |              | Record length (m)   |
|                          | X |   |   | <b>Macro</b> | Pool = (PL)   |
|                          |   | X |   | <b>Meso</b>  | Backwater = (PL-Bw)   |
|                          |   |   |   |              | Scour = (PL-Sr)   |
|                          |   |   |   |              | Slough = (SL-sl)  |
|                          |   |   | X | <b>Micro</b> | Backwater–Dammed = (PL-dm); Eddy = (PL-ed)                                |
|                          |   |   |   |              | Scour–Plunge = (PL-pp); Lateral = (PL-lsc); Mid-channel = (PL-mcs)        |
|                          |   |   |   |              | Slough–Slough = (SL-sl)   |
|                          |   | X | X |              | Record average wetted width (m)   |
|                          | X | X | X |              | Record maximum depth and pool tail crest depth                            |
| <b>Fastwater</b>         |   | X |   | <b>Meso</b>  | Glide = (GL)  |
|                          |   |   |   |              | Riffle = (RF)   |
|                          |   |   |   |              | Cascade = (CS)  |
|                          |   |   | X | <b>Micro</b> | Glide–Glide = (GL-gl); Cobble = (GL-cb); Boulder = (GL-bd)                |
|                          |   |   |   |              | Riffle–Riffle = RF-rf); Cobble = (RF-cb); Boulder = (RF-bd)               |
|                          |   |   |   |              | Cascade–Slip-face = (CS-sf); Chute = (CS-ch); Rapids = (CS-rp);           |
|                          |   |   |   |              | Step-pool = (CS-sp); Fall = (CS-fl)                                       |
|                          |   | X | X |              | Record average wetted width (m)   |
|                          |   | X | X |              | Record length (m)   |
| <b>Beaver Pond</b>       | X | X | X |              | Visually estimate beaver pond area connected to channel at bankfull flows |
|                          | X | X | X |              | Record streambank location (DL, DR, MC)                                   |

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25 – Exhibit 02 Continued

| Measure For Survey Tier | 2 | 3 | 4 | Catagories   |
|-------------------------|---|---|---|--|
| Side Channel            | X | X | X | Record Side channel length.  |
|                         | X | X | X | Stream bank location.  |
|                         | X | X | X | Record hip chain distance of inlet/outlet relative to LLID or GIS node.                |
|                         | X | X | X | Record approximate average channel bed width at start of survey segment.               |
|                         | X | X | X | Channel bed width (every 5th approx. avg. channel bed width).                          |
|                         | X | X | X | Count qualifying macro pools.  |
|                         | X | X | X | Record minimum required residual pool depth.   |
|                         | X | X | X | Record maximum and pool tail crest depth ( <i>Wet Channels Only</i> ).                 |
|                         | X | X |   | LWD tally.   |
|                         |   |   | X | Count LWD by size categories.  |
|                         | X | X | X | LWD key piece tally.   |
|                         |   | X | X | LWD clusters in two categories.  |
|                         | X | X | X | Flow (flowing, intermittent, or dry).  |
|                         |   | X |   | Habitat units ( <i>Meso</i> ).   |
|                         |   |   | X | Habitat units ( <i>Micro</i> ).  |
|                         |   | X | X | Measure average wetted width and length of habitat units ( <i>Wet Channels Only</i> ). |

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25 – Exhibit 03

Large Wood

| Measure For Survey Tier | 2 | 3 | 4 | Catagories                | Codes  |
|-------------------------|---|---|---|---------------------------|--|
| <b>Large Wood</b>       | X | X | X | <b>Total Count</b>        | Count all pieces that qualify as large wood<br>(Length m 1 m and Diameter m 0.1 m) |
|                         | X | X | X | <b>Key Pieces</b>         | Count of key pieces (rootwad and stem)   |
|                         |   |   |   | <b>Stem</b>               | Channel bed width    Piece Diameter    Piece Length                                |
|                         |   |   |   |                           | 0.0 - 4.9 meters    0.30 meters    > 3.0 meters                                    |
|                         |   |   |   |                           | 5.0 - 9.9 meters    0.30 meters    > 7.6 meters                                    |
|                         |   |   |   |                           | 10.0 - 19.9 meters    0.60 meters    > 7.6 meters                                  |
|                         |   |   |   |                           | ≥ 20.0 meters    0.60 meters    > 15 meters  |
|                         |   |   |   | <b>Root wad</b>           | Channel bed width    Root wad diameter   |
|                         |   |   |   |                           | 0.0 - 4.9 meters    > 1 meters   |
|                         |   |   |   |                           | 5.0 - 9.9 meters    > 3 meters   |
|                         |   |   |   |                           | 10.0 - 19.9 meters    > 3 meters   |
|                         |   |   |   |                           | ≥ 20.0 meters    > 3 meters  |
|                         | X | X | X | <b>Zone of Location</b>   | Zone 1 and 2 combined  |
|                         |   |   | X |                           | Zone 3 (keep separate)   |
|                         |   | X | X | <b>Cluster Categories</b> | 1 = 5–9 pieces touching  |
|                         |   | X | X |                           | 2 = 10 or more pieces touching   |
|                         |   |   | X | <b>Size Class</b>         | LW1 = 1 < log < 3 meter long; 0.1 to < 0.3 meter diameter                          |
|                         |   |   |   |                           | LW2 = 1 < log < 3 meter long; 0.3 to < 0.6 meter diameter                          |
|                         |   |   |   |                           | LW3 = 1 < log < 3 meter long; ≥ 0.6 meter diameter                                 |
|                         |   |   |   |                           | LW4 = 3 < log < 7.6 meter long; 0.1 to < 0.3 meter diameter                        |
|                         |   |   |   |                           | LW5 = 3 < log < 7.6 meter long; 0.3 to < 0.6 meter diameter                        |
|                         |   |   |   |                           | LW6 = 3 < log < 7.6 meter long; ≥ 0.6 meter diameter                               |
|                         |   |   |   |                           | LW7 = 7.6 < log < 15 meter long; 0.1 to < 0.3 meter diameter                       |
|                         |   |   |   |                           | LW8 = 7.6 < log < 15 meter long; 0.3 to < 0.6 meter diameter                       |
|                         |   |   |   |                           | LW9 = 7.6 < log < 15 meter long; ≥ 0.6 meter diameter                              |
|                         |   |   |   |                           | LW10 = log > 15 meter long; 0.1 to < 0.3 meter diameter                            |
|                         |   |   |   |                           | LW11 = log > 15 meter long; 0.3 to < 0.6 meter diameter                            |
|                         |   |   |   |                           | LW12 = log > 15 meter long, ≥ 0.6 meter diameter                                   |
|                         |   |   |   |                           | RW1 = 0.1 to 1.0 meter diameter without bole                                       |
|                         |   |   |   |                           | RW2 = > 1.0 to 2.9 meter diameter without bole                                     |
|                         |   |   |   |                           | RW3 = ≥ 3 meter diameter without bole  |

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25 – Exhibit 04  
Disturbance

| Record For Survey Tier       | 2 | 3 | 4 | Codes              |
|------------------------------|---|---|---|--------------------|
| <b>Disturbance</b>           | X | X | X | (Length of stream) |
| <i>Record for both banks</i> |   |   |   |                    |
| DR - downstream right bank   |   |   |   | MM = Mass Movement |
| DL - downstream left bank    |   |   |   | BD = Blow Down     |
| BB - Both banks              |   |   |   | RD = Road          |
|                              |   |   |   | OT = Other         |

25 – Exhibit 05  
Stream Buffer

| Record For Survey Tier       | 2 | 3 | 4 | Categories         |
|------------------------------|---|---|---|--------------------|
| <b>Stream Buffer</b>         | X | X | X | (Length of stream) |
| <i>Record for both banks</i> |   |   |   | No Harvest         |
| DR - downstream right bank   |   |   |   | Buffer Width:      |
| DL - downstream left bank    |   |   |   | No Buffer          |
| BB - Both banks              |   |   |   | <30 m              |
|                              |   |   |   | 30–60 m            |
|                              |   |   |   | >60 m              |

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25 – Exhibit 06

Substrate

| Record For Survey Tier | 2 | 3 | 4 | Size (mm) | Codes                                       |
|------------------------|---|---|---|-----------|---|
| Substrate              | X | X | X |           | <i>Recorded on the morphology data card</i> |
|                        |   |   |   | Bedrock   | BR = Bedrock                                |
|                        |   |   |   | >512      | LMB = Large/Medium Boulder                  |
|                        |   |   |   | 256–512   | SB = Small Boulder                          |
|                        |   |   |   | 128–255.9 | LC = Large Cobble                           |
|                        |   |   |   | 64–127.9  | SC = Small Cobble                           |
|                        |   |   |   | 32–63.9   | VCG = Very Coarse Gravel                    |
|                        |   |   |   | 16–31.9   | CGR = Coarse Gravel                         |
|                        |   |   |   | 8–15.9    | MGR = Medium Gravel                         |
|                        |   |   |   | 4–7.9     | FGR = Fine Gravel                           |
|                        |   |   |   | 2–3.9     | VFG = Very Fine Gravel                      |
|                        |   |   |   | <2        | SS = sand/silt                              |
|                        |   |   |   | Organic   | ORG = Organic                               |
|                        |   | X | X |           | Dominant substrate/habitat unit             |
|                        |   |   | X |           | % Dominant substrate/habitat unit           |

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25 – Exhibit 07

Cover

| Record For Survey Tier   | 2 | 3 | 4 | Codes  |
|--|---|---|---|--|
| Cover  |   |   | X | Tree Bole = TB<br>Rootwad = RW<br>Slash = SL<br>Debris Jam = DJ<br>Bedrock = BR<br>Large/Medium Boulder = LMB<br>Small Boulder = SB<br>Large Cobble = LC<br>Undercut Bank = UB<br>Depth = DE<br>Bridge/culvert* = BC<br>Weir = W <br>Log Structures = HL<br>Boulder Structures = HB<br>Overhanging Vegetation = OV<br>Aquatic Vegetation = AV<br>Other Human = HU<br>Insufficient or no cover = IC |
|  |   |   | X | Percent Cover  |
| * <i>Some bridges or culverts, particularly log structures, may provide cover.</i> |   |   |   |  |

25 – Exhibit 08

Channel pattern categories.

| Record For Survey Tier         | 2 | 3 | 4 | Codes   |
|--------------------------------|---|---|---|---|
| Stream Segment Channel Pattern | X | X | X | <i>(in Channel Morphology Survey)</i><br>M = Multiple<br>S = Single |



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25 – Exhibit 09  
Riparian Vegetation

| Record For Survey Tier  | 2 | 3 | 4 | Codes  |
|---|---|---|---|--|
| <b>Riparian Vegetation Type</b><br>(in Channel Morphology Survey) |   | X | X | CFC = Conifer Forest - Closed<br>CFO = Conifer Forest - Open<br>BFC = Broad leaf Forest - Closed<br>BFO = Broad leaf Forest - Open<br>NSW = Nonforest-Shrub - Willow<br>NSA = Nonforest-Shrub - Alder<br>NSO = Nonforest-Shrub - Other<br>NHE = Nonforest-Herbaceous - Estuarine<br>NHB = Nonforest-Herbaceous - Bog<br>NHF = Nonforest-Herbaceous - Fen<br>NHO = Nonforest-Herbaceous - Other |
| <b>Forest Seral Stage</b><br>(in Channel Morphology Survey)       |   | X | X | SS = Shrub-Seedling<br>SP = Sapling Pole (early second growth lacking understory vegetation)<br>YS = Young Saw-timber (> 9 inches DBH, even-aged canopy)<br>MT = Mature Timber (uniform canopy, some understory development)<br>OG = Old Growth Forest (multiple canopy, > 150 years old, developed understory vegetation)   |